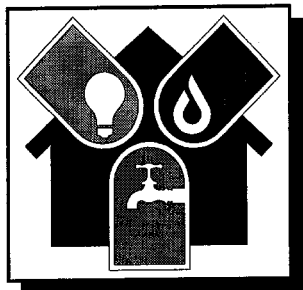


PROPOSED USE STUDY OF THE LOS ALAMOS NATIONAL LABORATORY JULY 1996



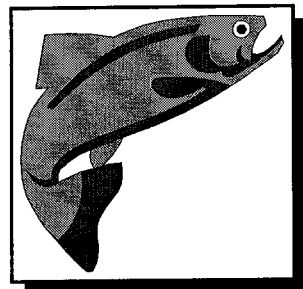
Prepared for:

Los Alamos National Laboratory
Water Quality and Hydrology Group
Los Alamos, New Mexico



United States Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico

New Mexico Environment Department
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Prepared by:

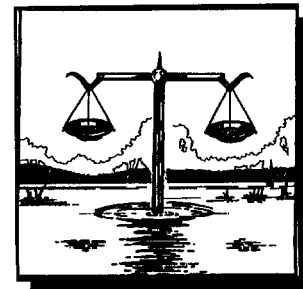
United States Department of the Interior

Fish and Wildlife Service
New Mexico Ecological Services Field Office
Environmental Contaminants Program
Albuquerque, New Mexico



in cooperation with:

National Biological Service
Midwest Science Center
Columbia, Missouri



Cooperative Fish and Wildlife Research Unit
New Mexico State University
Las Cruces, New Mexico

Executive Summary

At our houses, we drink, cook, bathe, wash, and garden with water, and in the landscape, we harvest materials (agricultural crops, forest products, livestock), energy (transportation, mining, power generation), and recreate (swim, fish, ski, boat) with water moving through the hydrologic cycle. Citizens, cities, tribes, and industries own rights to most of the surface water resources in New Mexico; therefore, the need for water, and its beneficial uses and services, are balanced by political organizations, and subject to increasingly frequent and complex litigations. During the 1970s, pollution was obviously degrading the quality of freshwater resources available for use, and subsequently, federal and state laws were passed to conserve these uses.

The Clean Water Act and New Mexico Water Quality Act require that the existing uses, attainable uses, and the mechanisms by which to change those uses be designated for all waters in New Mexico. The mechanism for evaluating a waterbody's existing use or attainable use is called a Use Attainability Analysis. Stakeholders in New Mexico desire to develop a new and efficient method to evaluate the use of water for fisheries and other uses in arid regions. Therefore, the U.S. Fish and Wildlife Service, in cooperation with the National Biological Service, has developed several procedures, utilizing fishery science and toxicity testing, to evaluate the existing or potential uses in the watercourses on Los Alamos National Laboratory (LANL or the Laboratory). This proposed investigation, which focuses on fishery use in conjunction with an evaluation of other uses of the watercourses at LANL, is called the Use Study.

The Use Study consists of four separate components. These are: 1) an aquatic habitat assessment of four watercourses on the Laboratory and a nearby reference site - this assessment will include a review of water quality data on file or generated by the Use Study participants; 2) toxicity testing of site water to determine if any limiting factors exist that would restrict the ability of the watercourses to support aquatic life or other uses; 3) an *in situ* toxicity test (using caged fish) to determine if any limiting factors exist at the site that would restrict the ability to support a fishery or other uses; and 4) after review and mutual agreement of the Use Study participants, a direct empirical evaluation of whether these watercourses support a fishery will be conducted by transplanting wild, native fish into four watercourses on the Laboratory and a reference site.

An identification of the existing or potential stream uses associated with the four watercourses into which LANL and Department of Energy discharge effluents subject to National Pollution Discharge Elimination System regulation will be made when adequate data become available. At the completion of the investigation, two reports will be made available to all Use Study participants and as requested. First, a data report will summarize all data collected and reviewed as part of this Use Study, and second, an interpretive report will provide an analysis of the data with an evaluation of any existing and potential stream uses.

The Use Study is an interagency project, with responsibilities distributed among the Fish and Wildlife Service, National Biological Service, Department of Energy, LANL's Environment, Safety and Health Division, and the New Mexico Environment Department Surface Water Quality Bureau. However, we invite any and all who are interested, to review, comment, and participate in the development of this proposal and scope of work.

INTRODUCTION

The designation of the beneficial uses of surface waters in New Mexico (domestic, municipal, or industrial water supply, irrigation, livestock watering, primary and secondary contact, fisheries, and wildlife habitat, for example) was required by the Federal Water Pollution Control Act ("Clean Water Act"), the New Mexico Water Quality Act, and other laws. These statutes, as amended, empowered the New Mexico Water Quality Control Commission (NMWQCC) to designate and protect the chemical, physical, and biological integrity of surface water resources of New Mexico.

For example, the State of New Mexico Standards for Interstate and Intrastate Streams (NMWQCC 1995) identifies the stream use designations for a segment of the Rio Grande Basin ("the main stem of the Rio Grande from the headwaters of Cochiti Reservoir upstream to Taos Junction Bridge. . . ." NMWQCC 1995; page 18). They are: irrigation, livestock watering, secondary contact, wildlife habitat, marginal coldwater fishery, and warmwater fishery. However, the particular beneficial uses within a segment can be contested, and there are procedures, such as the Use Attainability Analysis (USEPA 1983), which documents, identifies, and resolves the beneficial uses attributable to a specific waterbody.

The specific uses associated with the watercourses on Los Alamos National Laboratory (LANL or the Laboratory), presently managed and operated by the University of California (UC) and owned by the U.S. Department of Energy (DOE), were recently contested. The Rio Grande Basin segments established by the NMWQCC do not specifically encompass all the perennial reaches of the following canyons: Ancho Canyon, Water Canyon, Pajarito Canyon, Mortandad Canyon, Sandia Canyon, Los Alamos Canyon or its tributaries, and Guaje Canyon, which cross the Laboratory. As a result, these canyons are classified under the general standards, but the existing and attainable uses were contested. Rather than conducting the extensive Use Attainability Analysis, a Settlement Agreement (Appendix I) allowed the Laboratory and the DOE (called Petitioners), with the New Mexico Environment Department, to hire a third party consultant to conduct a study ". . . for the purposes of identifying the stream uses associated with the watercourses in the canyons into which Petitioners discharge waters subject to NPDES regulation."

The U. S. Fish and Wildlife Service New Mexico Ecological Services Field Office (Service) has submitted this proposed Use Study in response to the Settlement Agreement and to evaluate the existing and attainable uses of four watercourses on the Laboratory. The watercourses included in the Use Study are: selected reaches of Cañon de Valle, Pajarito Canyon, Sandia Canyon, and Los Alamos Canyon. During the Use Study, the Service proposes to focus on the assessment of fishery use, because the beneficial use of waters to support aquatic life can often require stringent numeric standards be applied to a discharge and can often be a contested use in arid regions where aquatic life can be sparse. Nonetheless, all information made available during this Use Study concerning existing and attainable uses associated with the canyons into which LANL and the DOE discharge, will be collected, evaluated, and presented in a final report.

The assessment of fishery potential will be conducted in four phases: Phase I) will characterize the existing physical habitat (flow, substrates, water quality, etc.); Phase II) will test site water to determine any acute or chronic toxicity to aquatic organisms under controlled conditions (in a laboratory); Phase III) will test *in situ* site conditions to determine any acute or chronic toxicity to caged fish; and Phase IV) will empirically determine the survival rate of wild, native fish transplanted into the sites (Note: Phase IV of this fishery assessment will only commence after the review, evaluation and mutual agreement of the Selection Committee and any other interested stakeholders (e.g., New Mexico Department of Game and Fish, the Pueblo of San Ildefonso). It is hoped that conducting the Use Study in this manner, will identify any factor(s) that may limit the attainment of a fishery or any other uses of the four selected canyons on LANL.

Study Area

Los Alamos National Laboratory began as part of the Manhattan Project during World War II with the responsibility of developing nuclear weapons. Currently, the University of California (UC) manages and operates the Laboratory for the Department of Energy (DOE). The DOE and the UC are responsible for ensuring the feasibility, safety, and security of nuclear weapons at the Laboratory.

The Laboratory is in north central New Mexico, about 100 km (60 mi) north of Albuquerque and 40 km (25 mi) northwest of Santa Fe (Figure 1). The 111 km² (43 mi²)

Laboratory is situated on the Pajarito Plateau, which consists of a series of finger-like mesas separated by deep canyons cut by ephemeral, intermittent, or interrupted streams. Mesa tops on LANL range in elevation from about 2,400 m (7,800 ft) near the Jemez Mountains to 1,650 m (5,400 ft) at their connection to the Rio Grande. Soils of the finger-like mesas are Bandelier Tuff, ash fall, ash fall pumice, and rhyolite tuff. The tuff was deposited from a volcanic eruption in the Jemez Mountains about 1.2 million years ago.

Surface water on the Laboratory occurs primarily as ephemeral, intermittent, and interrupted reaches of streams in the canyons. Perennial springs from the Jemez Mountains supply base flow to the upper reaches of some canyons. Volume is insufficient to maintain surface water connection across LANL to the Rio Grande; hydrologic connections and alluvial flow are interrupted by geologic faults that bisect the watercourses as well as evaporation, transpiration, and infiltration (ESH 1994). Effluents discharged from LANL enter some canyons at rates sufficient to maintain surface flows for varying distances. However, extreme change in elevation (Figure 2) and certain physical characteristics of these canyon environments may have effectively thwarted the natural migration of fish from the Rio Grande into the canyon watercourses on LANL.

Ephemeral, intermittent, and interrupted streams have deposited alluvium ranging in depth from 1m (3 ft) to more than 30 m (100 ft) in thickness along the canyon bottoms. Runoff and effluents that enter the canyons will infiltrate the alluvium until the downward movement is impeded by lenses of impermeable substrates or until it becomes saturated. This process created shallow lenses of perched groundwater that move down gradient within the alluvium toward the Rio Grande. The perched alluvial groundwater resources show some contamination from previous discharges by the Laboratory (ESH 1994).

DOE policy requires the Laboratory to comply with all federal and state environmental requirements. These requirements include handling, transport, release, and disposal of hazardous materials in conjunction with protection of archeological, historical, atmospheric, and natural resources (ESG 1986). The Federal Water Pollution Control Act established the National Pollutant Discharge Elimination System (NPDES) that required permitting all point source discharges. NPDES permits are issued and enforced by the USEPA, Region VI, Dallas, Texas. These permits establish specific chemical, physical, and biological criteria that an effluent must meet before discharge.

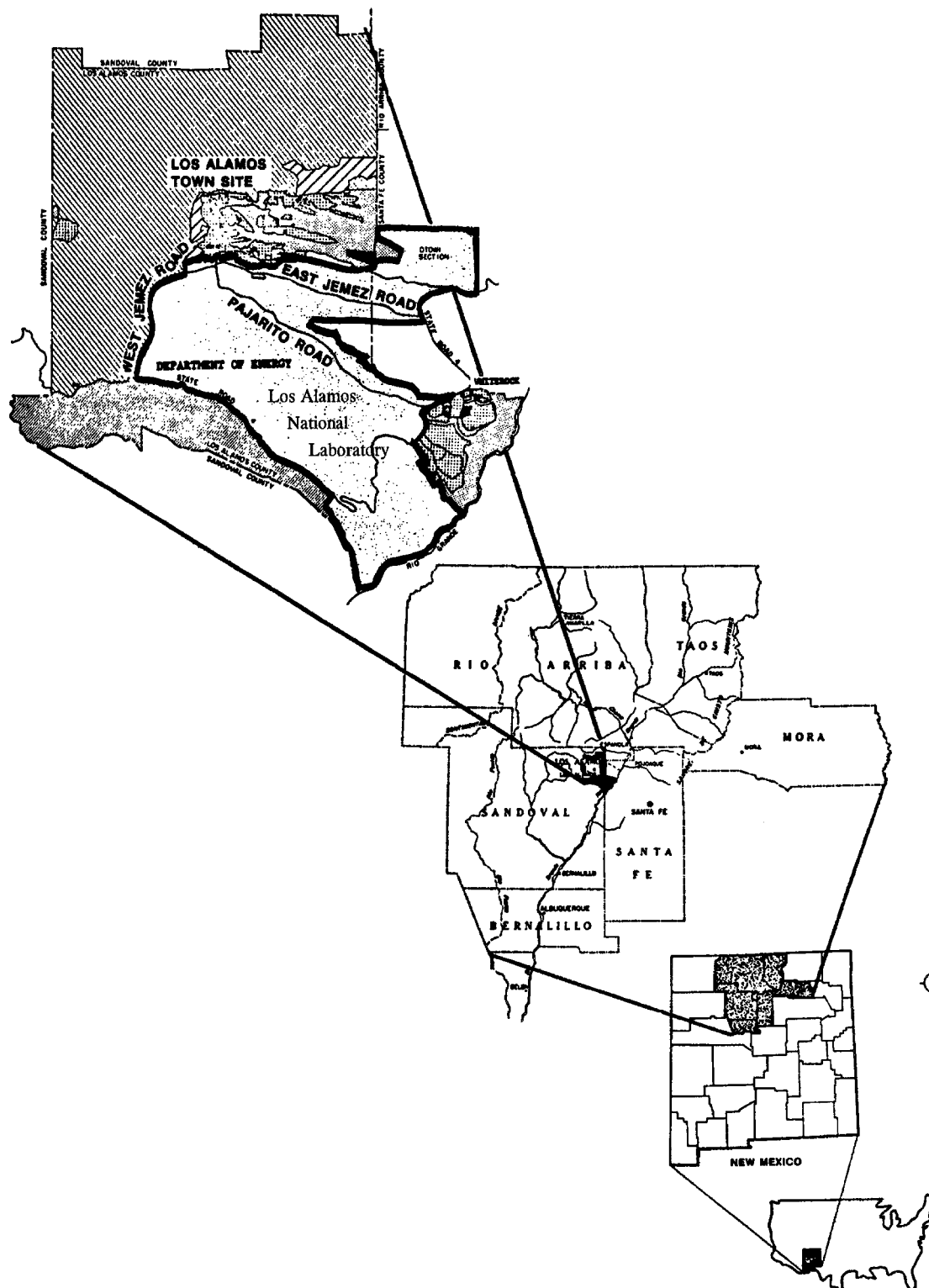


Figure 7. Location of Los Alamos National Laboratory in New Mexico. (Source: DOE 1979)

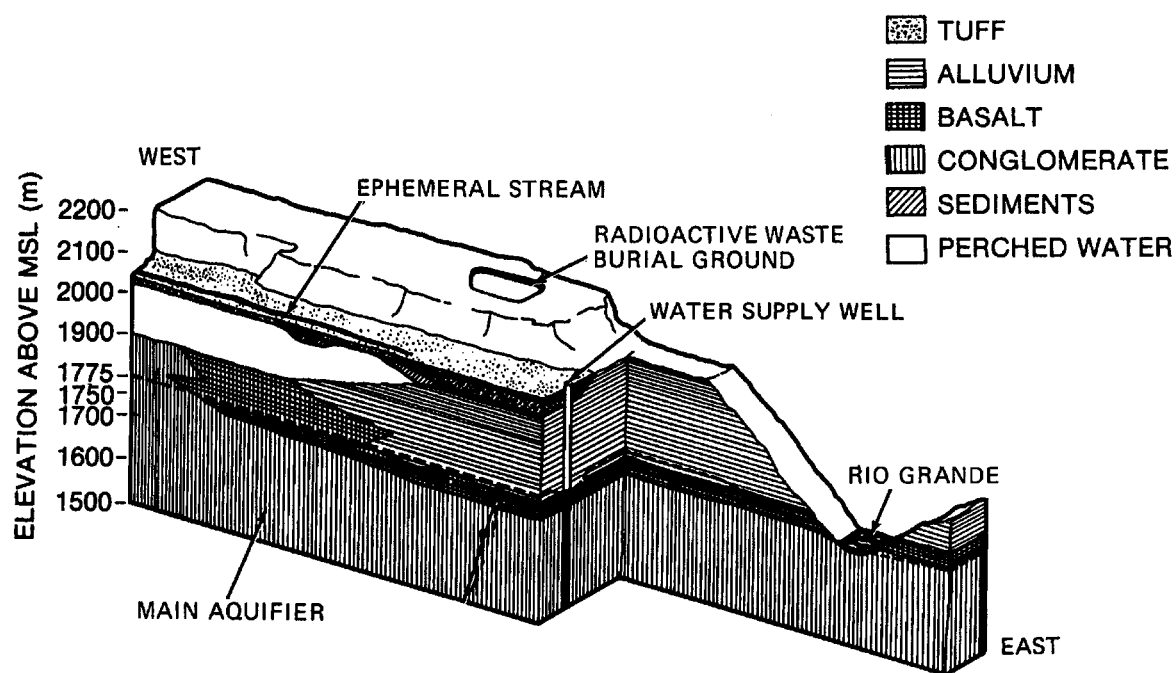


Figure 8: Geologic and Hydrologic Cross Section of Los Alamos National Laboratory. (Source: DOE 1979)

USE STUDY WORK PLAN AND METHODS

Scope and Objectives

This Use Study proposal and work plan was requested by the Selection Committee established in the Settlement Agreement between the Department of Energy, the Laboratory, and the New Mexico Environment Department on April 20, 1993 (Appendix I). The Use Study participants, affiliation, and addresses are provided in Appendix II. The overall objective of this study is to determine what uses are associated with any perennial reaches of the watercourses at the Laboratory. Forensic and scientific methods will be used to identify the most likely conditions that account for any observed failure of aquatic life to survive exposure to the canyon environments at the Laboratory. An auxiliary objective of this study is to help develop procedures to objectively evaluate the fishery use in waters of questionable water quality throughout New Mexico.

The objective of this work plan is to assure project completeness, replicability, comparability, precision, and accuracy. The primary purpose of this work plan is to maximize the probability that data collected over the duration of the project will meet the objectives, and thus, provide scientifically sound interpretations of the data in support of project goals. Various procedures are specified in this work plan to: (1) ensure that collection and measurement procedures are standardized among all participants; and (2) allow for the periodic assessment of the performance of the measurement systems and their components. The specific objectives of this Use Study are:

- 1) Collect, summarize, and present the water quality data for effluent discharges and in the receiving streams in comparison to New Mexico Standards for Interstate and Intrastate Streams (NMWQCC 1995),
- 2) Characterize the habitat (flow, depth, substrate, water and sediment quality) of the sites and compare to published effect concentrations for aquatic species.
- 3) Characterize any toxicity to invertebrates and fish at sites receiving discharges.
- 4) After mutual agreement on a site's fishery potential, empirically determine fish survival by transplanting native fish and observing them periodically.

Site Selection and Reconnaissance

Study sites were agreed upon by the Selection Committee, comprising representatives from the NMED, DOE, and LANL, and were based on recommendations, flow characteristics, and other factors. Sites selected include any perennial reaches of Cañon de Valle, Pajarito Canyon, Sandia Canyon, and Los Alamos Canyon below the Los Alamos Reservoir. The reference site selected was Los Alamos Canyon above Los Alamos Reservoir. There are two sanitary wastewater treatment facilities and 97 industrial outfalls on the Laboratory. However, some discharges have low volume, do not maintain surface flow into the canyons, and some discharges are planned for removal from the NPDES permit over several years.

The objective of the reconnaissance survey is to document any beneficial uses of water in the selected canyons. A site reconnaissance will be conducted that involves walking the watercourses within Laboratory boundaries (and the reference site). Preliminary observations will include descriptions of the general site features, animal species or remains encountered, cover, flow, substrate, and site suitability for the caged or wild fish placement, and any other indicators of water use. Any significant runoff, or aquatic vegetation (obligates) encountered will also be documented. A global positioning system (GPS) reading will be taken at each significant observation. Site reach extremes and transects will be marked with fence posts (or some similar, semi-permanent marker) and located using a GPS reading. Whenever documentation during reconnaissance indicates that a site is inadequate for the support of a fishery based on the lack of suitable habitat conditions (e.g., there is no flowing water), the site will be considered for removal from the study based on the unanimous decision of the Selection Committee.

A map of the study sites will be prepared as part of the Use Study. We anticipate utilizing the map resources available through LANL's Facility for Information Management, Analysis and Display of the Earth and Environmental Sciences Division. The use of videography or photography to document habitat conditions for future researchers would be helpful; given the Use Study's fiscal constraints, we invite the Laboratory escort to engage in video documentation of site conditions and methods.

Habitat Characterization

The objective of the habitat characterization is to evaluate the suitability of the watercourses for a fishery and other aquatic life uses. A fishery habitat is characterized by suitable flow, temperature, food, substrate, climate, and cover (depending on the fish species selected for evaluation). There are many other physical, chemical, and biological factors as well: pH, dissolved oxygen content, turbidity, toxic chemicals, competitors, etc.

A randomly-placed, perpendicular transect line will be established at an upper boundary of each site reach. After that, nine more transects will be placed systematically at 30 to 100 meter intervals in pool habitats. Interval distance will be determined and established after reconnaissance of the sites and will also consider site logistics. The latitude, longitude, and altitude of each transect will be established using a GPS.

The wetted channel width will be measured at each transect as described by Armour et al. (1983). At each transect, depth and dominant substrate will also be visually characterized using the line-intercept method (at a frequency no less than five times within the channel width). Stream substrate categories that will be used are those assigned by Platts et al. (1983) and will be coded to reflect the Brusven index (Bovee 1982).

The flow of oxygenated water is an intrinsic fishery habitat characteristic. We will measure water velocity in one of two ways depending upon the accuracy required. We will use either a Current Meter sensitive to the low level of discharge reported in these canyons (Model 2000 Marsh-McBirney, Gaithersburg, MD) or the floating object method described by Hamilton and Bergesen (no date). Using velocity, depth, and channel width measurements, we will calculate average discharge for the time of measurement according to Armour et al. (1983). Pools and riffle habitats within each site reach will be identified using Eiserman et al. (1975).

Certain water quality parameters (temperature, dissolved oxygen, pH, and standard conductivity) will be monitored regularly for at least one year to estimate seasonal variation. Variations in water quality can be associated with effluent discharges, and diel and seasonal changes (Lee and Jones, 1982). Only continuous monitoring would have the probability of recording the seasonal variation of these parameters. A Hydrolab Datasonde

will be used to measure these water quality parameters; its methods of measurement, if accompanied by documentation of calibration and standardization, are in accordance with EPA-approved methods.

Fish Surveys

The objective of the fish survey is to document if there is an existing fishery use in selected canyons on the Laboratory. Biologists, trained and certified to conduct electroshocking, will survey for fish by employing a backpack Smith-Root Model 12 or 12A POW Electroshocker. Before the surveys, biologists will determine the conductivity of the watercourse and then calculate the power (amperage) necessary to apply to the waterbody to ensure that any fish encountered will be stunned and subsequently captured. Data recorded during the surveys will include: how much power was applied to the water, the shocking seconds, catch-per-unit-effort, and conductivity.

In selected watercourses, electroshocking must be attempted at intervals no less than every 800 meters (\approx 250 strides) and must continue for approximately 10 meters (\approx three strides) or the discovery of fish, whichever comes first.

If found, fish will be identified using the guide prepared by Sublette et al. (1990), any other suitable texts, and the expertise of fishery biologists. Should any fish be discovered, a voucher specimen will be photographed and collected under chain-of-custody procedures, preserved in buffered formalin, and stored in ethyl alcohol. The Selection Committee will be formally notified of the discovery via written communication. If fish are captured at the site, live measurements of weight and total length will be measured using a measuring board, and a pan or spring scale. All specimens not taken as vouchers will be returned live to the watercourse.

It would be relevant to determine the biological productivity associated with the study reaches to determine if an adequate food supply exists to support aquatic vertebrates. However, given fiscal restraints, no formal aquatic invertebrate or plant studies will be conducted. Nonetheless, we welcome any existing information about the population density of invertebrates or productivity metrics that could be correlated with the water and habitat quality data for the sites.

Water and Sediment Quality Summary

All sample handling, storage, transportation, and analyses of sediment, water, and biological samples must be conducted under EPA-approved methods. All applicable water quality, fluvial sediment, and aquatic biological data summarized or collected must follow the methods authorized under 40 C.F.R. § 136 and Section 1103 of the New Mexico Water Quality Standards for Interstate and Intrastate Streams (NMWQCC 1995). The NMED is responsible for the review and certification that data summarized and methods used are in accordance with 40 C.F.R. § 136 and Section 1103. Additional sampling and analytical requirements for radioactivity and turbidity are established in 40 C.F.R. § 141.

Where no methods have been specified under the Clean Water Act, Use Study participants are free to use any other appropriate methods. Generally, biological samples will be chilled on ice while in the field, and frozen upon return to the laboratory. Chain-of-custody procedures will be used for sample collection if required by contract laboratories. Each analytical method used will be documented and accompanied by the results of a series of field and method blanks, duplicate and spiked analyses, and standard reference materials (at a 10% frequency) that assure and control the analytical data quality.

New Mexico has developed water quality standards that are legally enforceable limits on the concentrations of chemicals added to and in New Mexico's waters. These standards were designed to protect designated uses such as domestic water supply, irrigation, livestock watering, and fisheries. To evaluate the water quality of the watercourses on the Laboratory, any available water quality data (from NMED, LANL, DOE, any other entity or generated during this Use Study) for which standards exist will be compared with State of New Mexico Standards for Interstate and Intrastate Streams (NMWQCC 1995). Only data that meet EPA-approved methods (40 CFR 136) and are reviewed by the NMED will be collected, evaluated, and presented in the final report.

Despite evidence that contaminated sediments are the sources of many persistent and lethal chemicals (e.g., heavy metals, PCBs, chlorophenols) in an aquatic environment where they can cause long-term deleterious effects, many states have not developed sediment quality standards. Nonetheless, analytical sediment chemistry, which measures contamination, can be a valuable assessment tool when the results are compared with the

many studies that have associated chemical concentrations with deleterious effects (e.g., Long and Morgan 1990, Persuad et al. 1989). The most valuable use of sediment chemistry is in combination with toxicity and bioaccumulation tests to identify and characterize those contaminants that are bioavailable. All information made available from the NMED or LANL regarding the concentrations of inorganic and organic chemicals, or the amount of organic matter and clay content of site sediments will be summarized and compared with published criteria.

Laboratory Toxicity Testing

Toxicity testing will be contracted to an experienced and qualified laboratory with the National Biological Service (Midwest Science Center (MSC), Columbia MO). The protocol listed below is the designed method, and may be updated or changed to fit the actual site conditions, at the discretion of MSC and after review by the NMED. MSC has provided the following edited text (Dr. S. Finger, pers. comm., 1995). Toxicity tests will be conducted with water collected from each site for a 10-day period in a mobile laboratory. The mobile laboratory will be housed at LANL facilities during this testing. Test species used will be 72-hour old larval fathead minnows (Pimephales promelas), and 72-hour old daphnids (Ceriodaphnia dubia). Daphnids and fathead minnows are obtained from existing stock at the MSC. Daphnids will be shipped to the Laboratory and reared to reduce transport mortality and acclimate the organisms to local water quality conditions. Fathead minnow larvae are reared in MSC laboratory well water (280 mg/L hardness, 255 mg/L alkalinity, 7.8 pH).

Water will be collected from each site for toxicity testing as a 24-hour composite. For collection of composite samples, automated samplers (ISCO Inc., Lincoln, NE) will be used to collect water at 15-minute intervals throughout the 10-day study. Water will be pumped from each site through Teflon tubing into 19-liter acid-washed glass containers. Twenty-four hour composite water samples will be held in ice baths to maintain temperatures at 4°C during collection. At sites where automated samplers cannot be used, a single grab sample will be collected and stored on ice in acid-washed 19-L glass containers. Composite and grab samples will be transported to the mobile laboratory. The Midwest Science Center will make on-site measurements of air and water temperature, pH,

dissolved oxygen, salinity, and conductivity during collection of the water samples. Hardness, alkalinity, pH, conductivity, and turbidity of sample water will be measured daily at the mobile laboratory. Calcium, chloride, sulfate, nitrate, and unionized ammonia will also be measured on alternate days during the toxicity tests. At least twice, water will be analyzed for 30 metals, metalloids, and radionuclides, at the beginning and middle of the toxicity tests.

Tests will be conducted as static renewals following USEPA (1985) and ASTM (1988) protocol for toxicity testing. Fathead minnows will be fed freshly-hatched brine shrimp nauplii (*Artemia*) twice daily. Daphnids will be fed the USEPA yeast/trout chow/Cerophyl (cereal leaves) formula (USEPA 1985). Tests with fathead minnows and daphnids will include two replicates per treatment and 10 organisms per replicate. Treatments will use full strength sample water and dilutions of 50, 25 and 12.5 percent. Dilution water for each test will be collected from the reference site (Los Alamos Canyon above Los Alamos Reservoir, which demonstrated no toxicity to daphnids [D. Chapman, pers. comm. 1996]).

Water quality (temperature, dissolved oxygen, pH, conductivity, salinity) will be measured daily in fathead minnow and daphnid test chambers. Adequate oxygen levels (at least above 40% saturation) will be maintained in test chambers by continual aeration. Daily mortality will be recorded during all tests. For daphnids, time to first brood, number of broods, and number of young will be recorded as a measure of reproductive success.

Sediment Analyses and Porewater Toxicity Testing

Sediments will be collected for chemical analyses and porewater will be extracted for toxicity testing. Methods for sediment collection are detailed in Fishman and Friedman (1989), with suggested revisions by Carter (1993), Baize (1993), or other method improvements and reviews. Generally, a composite sediment sample will be made of three proximal transects; three composite samples per site reach will be chemically analyzed using the appropriate spectroscopic method. Sediment will be collected using a hand corer (Wildco, Inc., Saginaw, MI) lined with an acid-rinsed, stainless steel or polycarbonate sleeve.

Toxicity of sediments at each site will be evaluated by sediment porewater assays (Winger and Lasier 1991, 1993, Ingersoll and Nelson 1990). Sediment porewater samples will be extracted with a vacuum-operated device consisting of a 60-cc polyethylene syringe, air-line tubing, and a fused-glass air stone (Winger and Lasier 1991). *Ceriodaphnia dubia* will be exposed to 20 ml of pore water in 30-ml plastic containers for 96 hours. Treatments for each location will include three dilutions (100%, 50%, and 25%) and a control. Tests will be conducted in an environmental chamber at 20°C. Porewater and dilution water will be chemically analyzed using EPA-approved methods.

In Situ Toxicity Testing

The objective of the *in situ* toxicity test is to verify the laboratory toxicity tests and establish if other site factors contribute toxicity to aquatic life. A pilot study will be conducted before the initiating the *in situ* fish toxicity tests, in 1997, to determine the effect of varying discharge on cage placement, cage integrity, and species mortality. During *in situ* toxicity testing, cages will be fastened to hold fasts or secured using wooden stakes nearby. Cages will be placed at each transect. After an estimate of naturally occurring mortality at the reference site is established through the pilot study, the number of cages and fish per cage will be calculated to assure study design meets stated objectives. Cages will be located in those pool or run habitats deemed suitable for fish survival.

Cages for containing test fish will be minnow traps constructed either out of plastic or galvanized steel. Mesh size will be small enough to prevent fish escape, yet allow water and potential food items to flow in freely. Cages might be modified using monofilament, have an access panel, and a small panel of cover (for shade, if necessary).

We have decided to use the fathead minnow (*Pimephales promelas*) as a test organism because of its wide tolerance of water quality conditions, ease in propagation, omnivorous feeding habits, its native status in the Rio Grande basin (Sublette et al. 1990), and comparability to fish used in laboratory toxicity tests. The number of fish per cage has yet to be determined but will be based on the variation of mortality observed in the pilot study. To reduce variability, as well as the potential for escaped fish to propagate, only female fathead minnows will be used for the *in situ* toxicity tests. Additionally, male minnows are

territorial during spawning seasons in the spring and summer (Sublette et al. 1990) and can add additional stress to the test populations. Fish will be reared at a MSC aquaculture facility and be of the same age and size. The age and size of the fish have yet to be selected, but will be determined in relation to the internal diameter of the cage mesh openings.

After delivery to the site, fish will be acclimated to site conditions using a series of dilutions. About 10 fish will be allowed to remain in coolers for a day to verify that transport does not contribute to fish mortality. Blood and other tissues from an additional 10 fish, will be collected for analytic chemistry to establish baseline chemical concentrations and physiological condition before and after site exposure. Fish will be randomly selected, weighed, measured, and then placed into the cages. For each day, during the 96-hour test, each site will be visited, and each cage will be inspected for fish mortality or any behavioral abnormalities. All observations of fish mortality, health and behavior will be recorded daily for 96 hours, then weekly afterwards. Fish will be removed from the cages, when and if they die, and composited into samples for chemical analyses. We define mortality as fish that are floating, moribund, or if gill movement has ceased. Otherwise, fish will remain for as long as necessary to collect information about their response to the environment.

During the *in situ* toxicity tests, the NMED and/or LANL have planned to conduct a water quality monitoring survey to compliment and validate the toxicity results. The expectation is an analysis of selected water quality parameters from each site before, during, and after the 96-hr *in situ* toxicity tests.

Empirical Survival Testing

It is possible that the selection of test fish species, or the placement of cages could affect the survivability of fish. Therefore, after a preliminary presentation of the data and results to several stakeholders (the Selection Committee, the New Mexico Department of Game and Fish, Tribes, and others), the Service would suggest the transplantation of native, wild fish into each approved site and then monitor their survival for nine months.

An assemblage of native, wild fish would be collected from the Rio Grande at the confluence with the canyons, transported to the site reach and released. A subset of the transplanted fish would be kept alive in coolers for up to 24 hours to determine transport mortality. Native fish have the advantage of being adapted to the environment and a breadth of diversity; also, many species and sizes will likely be used. The disadvantage of this method is that there is a possibility that we will never recover the released fish and perhaps mistakenly conclude that survival of fish is not possible, when in fact, the fish might have simply eluded capture or been depleted from the environment for lack of sufficient individuals. One way to control fish movement and passage is to deploy fences across a segment of a stream. Fencing a segment of the site reach would improve our chances of rediscovering transplanted fish. However, spring floods and accumulating debris would require frequent monitoring and fence maintenance. Any additional fish surveys would be completed by about nine months following transplantation.

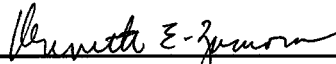
CONSENSUS PAGE

This Scope of Work was developed in accordance with the terms of the Settlement Agreement by and between NMED, DOE, and the Regents of the University of California (collectively, the "Parties") and approved by the NMWQCC, as file in the case styled In Re: Conditional Certification of Draft NPDES Permit No. NM0028355, before the NMWQCC, as amended by the Amendment to Settlement Agreement executed by the Parties and approved by the NMWQCC on January 11, 1996 (the "Agreement"). Pursuant to that Agreement, the Parties have fully participated in and do hereby approve this Scope of Work as the statement of work, scope of workplans, and required studies necessary to accomplish the purpose of the study to be conducted under the terms of the Agreement.

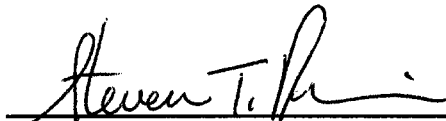
If the U.S. Fish and Wildlife Service is able to conduct the Use Study with reduced efforts than those contained in under this Scope of Work, the Service will redirect any remaining resources to address additional water quality issues selected by the Selection Committee.



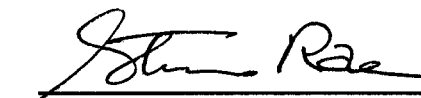
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LITERATURE CITED

- Armour, C.L., K.P. Burnham, and W.S. Platts. 1983. Field methods and statistical analyses for monitoring small salmonid streams. United States Department of Interior, Fish and Wildlife Service, FWS/OBS-82/33. 200 pp.
- ASTM (American Society for Testing and Materials). 1989. Standard guide for conducting acute toxicity tests with fishes, macroinvertebrates, and amphibians. Pages 378-397 in 1990 Annual book of ASTM Standards, Volume 11.04. Philadelphia, PA.
- Baize, D. 1993. Soil Science Analyses: A Guide to Current Use. John Wiley and Sons, New York, New York. 192 pp.
- Boulding, J. R. 1991. Description and sampling of contaminated soils: A field pocket guide. U. S. Environmental Protection Agency, Center for Environmental Research Information, Technology Transfer, EPA/625/12-91/002. Cincinnati, OH. 122 pp.
- Bovee, K.D. 1982. A guide to stream habitat analyses using the instream flow incremental methodology. United States Department of Interior, Fish and Wildlife Service. Instream Flow Information Paper No. 12, FWS/OBS-82/26. 248 pp.
- Lee, G.F. and R.A. Jones. 1982. An approach for evaluating the potential significance of chemical contaminants in aquatic habitat assessment. Pages 294-302 in Proceedings of the American Fisheries Society Symposium, "Acquisition and Utilization of Aquatic Habitat Inventory Information." October 1981, Portland, OR.
- Carter, M.R. (Ed.). 1993. Soil Sampling and Methods of Analysis. Canadian Society of Soil Science, Lewis Publishers. 823 pp.
- DOE (U.S. Department of Energy). 1979. Final Environmental Impact Statement: Los Alamos Scientific Laboratory Site, Los Alamos, New Mexico. U.S. Department of Energy, DOS/EIS-0018, Washington, D.C.
- EPG (Los Alamos National Laboratory Environmental Protection Group). 1994. Environmental Surveillance at Los Alamos during 1992. Los Alamos National Laboratory, LA-12764-ENV, Los Alamos, New Mexico.
- ESG (Los Alamos National Laboratory Environmental Surveillance Group). 1986. Environmental Surveillance at Los Alamos during 1985. Los Alamos National Laboratory, LA-10721-ENV, Los Alamos, New Mexico. 208 pp.
- Fishman, M.J., and L.C. Friedman (Eds.). 1989. Methods for determination of inorganic substances in water and fluvial sediments. Book 5, Chapter A6, In U.S. Geological Survey Techniques of Water-Resources Investigations. 545 pp.
- Hamilton, K., and E.P. Bergersen. No date. Methods to Estimate Aquatic Habitat Variables. Colorado Cooperative Fishery Research Unit, Fort Collins, CO. 217 pp.
- Ingersoll, C.G., and M.K. Nelson. 1990. Testing sediment toxicity with *Hyaella azteca* (Amphipoda) and *Chironomus riparus* (Diptera). Pages 93-110 in Aquatic Toxicology and Risk Assessment, W.G. Landis and W.H. van der Schalie (Eds.), Environmental Toxicology and Risk

Assessment, 13th Volume, ASTM STP 1096. American Society for Testing and Materials, Philadelphia, PA.

Long, E.R., and L.G. Morgan. 1990. Potential for biological effects of sediment-sorbed contaminants tested in the National Status and Trends Program. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Oceanography and Marine Assessment Technical Memorandum No. NOAA/TM-NOS/OMA-52. National Technical Information Service, Springfield, VA. 232 pp.

NMWQCC (New Mexico Water Quality and Control Commission). 1995. State of New Mexico Standards for Interstate and Intrastate Streams. New Mexico Water Quality Control Commission, Santa Fe, New Mexico. 51 pp.

Persuad, D., R. Jaagumagi, and A. Hayton. 1989. Development of Provincial Sediment Quality Guidelines. Ontario Ministry of the Environment, Water Resources Branch, Aquatic Biology Section, Toronto, Ontario, Canada. 19 pp.

Platts, W., W.F. Megahan, and G.W. Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. United States Department of Agriculture, Forest Service, General Technical Report INT-138. Intermountain Forest and Range Experiment Station, Ogden, Utah. 70 pp.

Sublette, J.E., M.D. Hatch, and M. Sublette. 1990. The Fishes of New Mexico. University of New Mexico Press, Albuquerque, New Mexico. 393 pp.

U.S. EPA (Environmental Protection Agency). Technical support manual: Waterbody surveys and assessments for conducting use attainability analyses. Office of Water, Regulations and Standards, Washington, D.C.

U.S. EPA. 1985. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. EPA/600/4-85/013. Environmental Monitoring and Support Laboratory, Cincinnati, OH.

Winger, P.V., and P.J. Lasier. 1991. A vacuum-operated pore-water extractor for estuarine and freshwater sediments. Archives of Environmental Contamination and Toxicology 21:321-324.

Winger, P.V., and P.J. Lasier. 1993. Sediment toxicity testing: Comparison of methods and evaluation of influencing factors. In J.W. Gorsuch, F.J. Dwyer, C.G. Ingersoll, and T.W. LaPoint, (eds.), Environmental Toxicology and Risk Assessment, 2 Volume. American Society for Testing and Materials, ASTM STP 1173, Philadelphia, PA.

Woodward, C.C. and R.J. Strange. 1987. Physiological stress responses in wild and hatchery-reared rainbow trout. Transactions of the American Fisheries Society 116:574-579.

APPENDICES

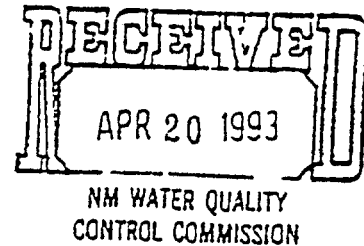
APPENDIX I. SETTLEMENT AGREEMENT.

BEFORE THE NEW MEXICO WATER QUALITY CONTROL COMMISSION

IN RE: CONDITIONAL CERTIFICATION)
OF DRAFT NATIONAL POLLUTANT)
DISCHARGE ELIMINATION SYSTEM)
(NPDES) PERMIT NO. NM0028355)
)

THE REGENTS OF THE UNIVERSITY OF)
CALIFORNIA and the UNITED STATES)
DEPARTMENT OF ENERGY,)
)

Petitioners.)
)
)



SETTLEMENT AGREEMENT

The United States Department of Energy, The Regents of the University of California (collectively, the "Petitioners"), and the New Mexico Environment Department ("NMED"), agree:

1. Recitals. On October 14, 1992, Petitioners filed a Petition for Review with the New Mexico Water Quality Control Commission ("Commission") appealing the conditional certification dated September 11, 1992, by NMED (the "Conditional Certification") of the draft NPDES Permit published May 16, 1992 (the "1992 Draft NPDES Permit") by the United States Environmental Protection Agency ("USEPA"). Pursuant to an order of the Hearing Officer, the parties met on March 17, 1993 for purposes of negotiation of a possible settlement of this proceeding. At the settlement conference, the parties agreed to certain points of settlement and agreed to continue settlement negotiations. Settlement negotiations have been ongoing since that date, and an agreement in principle with respect to settlement of this matter has been reached.

2. Purpose. The purpose of this agreement is to set forth all of the terms and conditions of the settlement among Petitioners and NMED in this proceeding.

3. Conditional Certification. NMED will withdraw the Conditional Certification and issue a new certification certifying the 1992 Draft NPDES Permit based upon effluent limitations that protect livestock and wildlife watering, as set forth in Section 3-101 and other applicable sections of the New Mexico Water Quality Standards for Interstate and Intrastate Streams in New Mexico ("The New Mexico Water Quality Standards") and other applicable state and federal laws and regulations. The effluent limitations in the certification shall be those set forth in Exhibit 1 to this agreement. Exhibit 1 to this agreement is incorporated into this agreement as if fully set forth in this agreement. The new certification shall provide for a term of the 1992 NPDES Permit of five years from the date issued and shall provide for a reopener clause containing the provisions set forth in paragraph 4 below.

4. Reopener Clause. The 1992 NPDES Permit shall contain a reopener clause to allow the permit to be modified, as required, under the following circumstances:

- (A) to reflect any applicable changes to the New Mexico Water Quality Standards;
- (B) to impose new or additional permit limitations as allowed by law or regulation that

arise as a result of the information obtained from the study referred to below in Section 6;

(C) as provided by law. For the purpose of this paragraph 4C, Petitioners will provide NMED with copies of its annual environmental surveillance reports, the addition and deletion of new outfalls, its waste stream characterization final studies, and its NPDES discharge monitoring reports.

5. Voluntary Dismissal of Petition for Review and Withdrawal of Motions. Petitioners shall file a voluntary dismissal of their Petition for Review and the parties shall withdraw all pending motions after NMED has withdrawn the Conditional Certification and issued the new certification.

6. Study. A study shall be conducted for the purpose of identifying the stream uses associated with the watercourses in the canyons into which Petitioners discharge waters subject to NPDES regulation. The study shall be prepared by a neutral, unbiased, third party who shall be selected as provided under the New Mexico Procurement Code for the provision of services by professional consultants. A four-person selection committee composed of two representatives of Petitioners and two representatives of NMED shall be established. The selection committee shall prepare a request for proposals ("RFP"), including a statement of work, and select the consultant to conduct the study. The parties shall have the right to fully

participate in drafting the RFP, including the scope of workplans and required studies necessary to accomplish the purpose of the study and to review all drafts of the study and provide comments on all drafts.

If the selection committee cannot agree on any matter within its responsibility, the matter shall be referred to a dispute resolution committee whose members shall be the Secretary or Deputy Secretary of NMED, the Associate Director for Operations of the Los Alamos National Laboratory and the Manager of the Los Alamos Area Office of the Department of Energy. The dispute resolution committee shall make a good faith effort to resolve the matter. If the dispute resolution committee cannot unanimously agree on a resolution of the matter, the Secretary of NMED shall make the final decision concerning the matter.

7. NMED Review of Data and Studies. After NMED issues the new certification, the parties shall have the right to submit data and studies, including water quality, hydrological and ecological data and studies, to the consultant selected under the RFP only after prior NMED determination that the water quality data for use by the consultant adheres to the methods authorized under 40 C.F.R. § 136 and Section 1-103 of the New Mexico Water Quality Standards, to the extent that 40 C.F.R. § 136 and Section 1-103 are applicable to the data being submitted. Copies of any data or studies provided to the consultant by NMED shall be provided to Petitioners.

8. Access to Data. The parties shall have the right to access and copy, during normal business hours, all raw and validated data associated with any data or studies submitted to or prepared by the consultant for purposes of conducting the study.

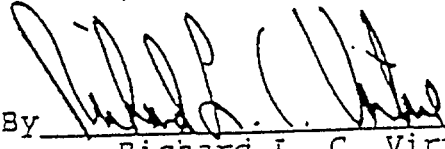
9. Cost of the Study. Petitioners shall contribute up to \$180,000 for fees and costs of the consultant that conducts the study described in paragraph 6.

10. Approval by Commission. Pursuant to paragraph 12 of the Procedural Order entered by the Commission in this proceeding, this agreement is subject to approval of the Commission..

11. Entire Agreement - Binding Effect. This agreement constitutes the entire agreement of the parties and the obligations hereunder shall be binding on the parties and their successors jointly and severally after approval by the Commission.

DATED: April 20, 1993.

VIRTUE, WILSON & NAJJAR

By 
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UNITED STATES DEPARTMENT OF
ENERGY

By 

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approved by telephone
4-20-13

NEW MEXICO ENVIRONMENT DEPARTMENT

By 

Susan McMichael, Esq.
Counsel for the New Mexico
Environment Department
P.O. Box 26110
Santa Fe, NM 87501

APPROVED:

William R. Hendley
Hearing Officer

APPROVED:

NEW MEXICO WATER QUALITY
CONTROL COMMISSION

By _____

Chairperson

We hereby certify that we have
mailed a copy of the foregoing
pleading to the following persons
this 21st day of April, 1993, *except as noted below*

Ms. Gloria Miller *by hand delivery on April 20*
Hearing Clerk
New Mexico Environment Department
P. O. Box 26110
Santa Fe, NM 87501

William R. Brancard, Esq.
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VIRTUE, WILSON & NAJJAR

By 

Richard L. C. Virtue

stlmt.agr

April 20, 1993

EXHIBIT

Parameter ¹	Adjusted WQS/Effluent Limit ²
Aluminum	5.0 mg/l
Arsenic	0.04 mg/l
Boron	5.0 mg/l
Cadmium	0.2 mg/l
Chromium	5.1 mg/l
Cobalt	1.0 mg/l
Copper	1.6 mg/l
Lead	0.4 mg/l
Mercury	0.01 mg/l
Radium 226 + 228	30.0 pCi/l
Selenium	0.05 mg/l
Tritium ³	3×10^{-3} μ Ci/ml (3,000,000 pCi/l)
Vanadium	0.10 mg/l
Zinc	95.4 mg/l
fecal coliform bacteria ⁴	500/100 ml
Chemical Oxygen Demand ⁵	125 mg/l
pH ⁵	between 6.0 and 9.0 S.U.

All values based upon Water Quality Standards for Interstate and Intrastate Streams in New Mexico (WQS) §3-101.K, unless otherwise noted. All values are expressed as "total." Federal regulation 40 CFR 122.45(c) requires effluent limit values for metals to be expressed as "total." In order to make the transition from dissolved WQS to total effluent limits, the WQS values are translated to "total" utilizing partition coefficients from the EPA document entitled Technical Guidance Manual for Performing Wasteload Allocations, Book II Streams and Rivers Chapter 3 Toxic Substances, EPA-440/4-84-022, June 1984. For parameters with no coefficient in the cited document, the total value is considered to be the same as the dissolved.

²Standards adjusted as necessary to TSS=15 mg/l, where partition coefficients are available. TSS value represents average of ambient TSS data collected by NMED May 5-7, 1992.

³Based upon WQS §1-102.G. Applicable where meets definition of "pollutant" at 40 CFR 122.2.

⁴In accordance with Work Element 6 of the NM Water Quality Management Plan. Applies only to sanitary outfalls.

⁵As delineated in the July 16, 1992 State certification enclosure pg. 3, ¶ 3, attached hereto as exhibit A.

⁶In accordance with Work Element 6 of the NM Water Quality Management Plan. Applies at

A

State Certification
NPDES Permit # NM0021153
Los Alamos National Laboratory
July 16, 1992

The fecal coliform limit for these outfalls must be 500/100ml daily maximum.

It is understood that LANL was supposed to eliminate all sanitary outfalls by July, 1992, with the exception of 055 and 135. However, this has not occurred and fecal coliform limitations apply to all discharges of treated domestic wastewater in New Mexico. Compliance with these limitations can be addressed in the permittee's Federal Facility Compliance Agreement (FFCA) or through a compliance schedule developed by EPA's Enforcement Branch. A waiver for sources without chlorination shall not be written into the permit as currently proposed by the permit writer; especially one that includes a schedule which terminates on a date that violates the permittee's current FFCA and Administrative Order. (See endnotes: 1, 2 & 3).

3. A Chemical Oxygen Demand (COD) effluent limitation of 125 mg/l shall be included in the permit for those outfall categories which exhibited COD values in excess of this value in samples taken either for the permit application or for past Discharge Monitoring Reports. These categories should include, but are not limited to, 051, 045, 055, 095 and all other categories which have a probability of exceeding this value. This limit for these outfalls is necessary in order for conditions of this permit to be compatible with appropriate State regulation which may be found at § 2-101 of the New Mexico Water Quality Control Commission Regulations, as amended through August 11, 1991. (See endnotes: 2 & 3)
4. Mass based effluent limits for Biochemical Oxygen Demand (BOD5) and Total Suspended Solids must be included at outfall 125. Mass-based effluent limits are required for NPDES permits at 40 CFR 122.45. Mass-based limits should be calculated using 'long term daily average' and 'design maximum' flows at this facility. (See endnote: 3)
5. Limitations and monitoring requirements for radium, tritium, or other naturally occurring and accelerator produced radiological contaminants contributed to the wastewater treatment facilities at TA-50 (outfalls 050 and 051) and TA-53 (outfall 095) should be included in the permit. We agree with the draft permit that tritium needs to be limited at TA-53; however, we feel the discharge limitation should be 20,000 pCi/l (see above table of WQS). This number should also be applied at Outfalls 050 and 051. (See endnotes: 1, 2 & 3).

* should add 051 045 055 095

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BEFORE THE NEW MEXICO WATER QUALITY CONTROL COMMISSION

IN RE: CONDITIONAL CERTIFICATION)
OF DRAFT NATIONAL POLLUTANT)
DISCHARGE ELIMINATION SYSTEM)
(NPDES) PERMIT NO. NMOO28355)

THE REGENTS OF THE UNIVERSITY OF)
CALIFORNIA and the UNITED STATES)
DEPARTMENT OF ENERGY,)

Petitioners.)
_____)

RECEIVED
JAN 22 1996
USFWS - NMESO

AMENDMENT TO SETTLEMENT AGREEMENT

The United States Department of Energy, The Regents of the University of California (collectively, the "Petitioners"), and the New Mexico Environment Department ("NMED"), (collectively the "Parties") agree:

1. Recitals. The Parties in this matter entered into a Settlement Agreement dated April 20, 1993 (the "Settlement Agreement"). The New Mexico Water Quality Control Commission ("Commission") and the Hearing Officer in this matter subsequently approved that Settlement Agreement. In association with furthering the goals of the Settlement Agreement, the Parties have reached an agreement in principal with respect to certain amendments to the Settlement Agreement.

2. Purpose. The purpose of this Amendment is to modify certain terms and conditions of the Settlement Agreement among Petitioners and NMED in this proceeding.

3. Paragraph 6 of the Settlement Agreement shall be deleted in its entirety and the following language shall be substituted in its place:

6. Study. A study shall be conducted for the purpose of identifying the stream uses associated with the watercourses in the canyons into which Petitioners discharge waters subject to NPDES regulation. The study shall be prepared by the Fish and Wildlife Service of the United States Department of Interior ("U.S. Fish and Wildlife"). The parties believe that U.S. Fish and Wildlife is the most cost effective and technically qualified organization to conduct this study because of its technical expertise, its experience in conducting similar studies for other state and federal agencies, its knowledge of the subject matter covered by the scope of this study and its familiarity with the facility and the surrounding area.

The parties shall have the right to fully participate in and approve the statement of work, scope of workplans and required studies necessary to accomplish the purpose of the study to be conducted by U.S. Fish and Wildlife. If the parties cannot agree upon any of these matters, the dispute shall be referred to a dispute resolution committee whose members shall be the Secretary or Deputy Secretary of the NMED, the Director or Deputy Director of the ESH Division of the Los Alamos National Laboratory and the Manager of the Los Alamos Area Office of the Department of Energy. The dispute resolution committee shall make a good faith effort to resolve the matter. If the dispute resolution committee cannot unanimously agree on a resolution of the matter, the Secretary of NMED shall make the final decision concerning the matter. The parties shall also have the right to review and comment on all drafts of the study prepared by U.S. Fish and Wildlife.

4. Paragraph 7 of the Settlement Agreement shall be deleted in its entirety and the following language shall be substituted in its place:

7. NMED Review of Data and Studies. After NMED issues the new certification, the parties shall have the right to submit data and studies, including water quality, hydrological and ecological data and studies, to U.S. Fish and Wildlife only after prior NMED determination that the water quality data for use by the consultant adheres to the methods authorized under 40 C.F.R. S 136 and Section 1103 of the New Mexico Water Quality Standards, to the extent that 40 C.F.R. S 136 and Section 1103 are applicable to the data being submitted. Copies of any data or studies provided to U.S. Fish and Wildlife by NMED shall be provided to Petitioners.


5. Paragraph 9 of the Settlement Agreement shall be deleted in its entirety and the following language shall be substituted in its place:

9. Cost of the Study. Petitioners shall pay to U.S. Fish and Wildlife up to \$180,000 for the fees and costs of conducting the study described in Paragraph 6 of the Settlement Agreement, as said paragraph is modified by Paragraph 3 of this Amendment to the Settlement Agreement.


6. Approval by Commission. Pursuant to paragraph 12 of the Procedural Order entered by the Commission in this proceeding, this Amendment is subject to approval of the Commission.

7. Entire Agreement - Binding Effect. The Settlement Agreement, as modified by this Amendment to Settlement Agreement, constitutes the entire agreement of the Parties and the obligations hereunder shall be binding on the Parties and their successors jointly and severally after approval by the Commission.

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APPROVED:

New Mexico Water Quality
Control Commission

By Jim Ratz
Chairperson

APPENDIX II. LOS ALAMOS NATIONAL LABORATORY USE STUDY

PARTICIPANTS

USE STUDY PARTICIPANTS

Selection Committee

The Settlement Agreement established a four-person Selection Committee composed of representatives of the U.S. Department of Energy, Los Alamos National Laboratory and two representatives of the State of New Mexico are designated by "*" below: Additional personnel are also listed.

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